



BL-M8812CU3

802.11ac 867Mbps WLAN

USB2.0 Module Specification

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(Top View)



(Bottom View)

Module Name: BL-M8812CU3

Module Type: 802.11a/b/g/n/ac 867Mbps WLAN USB2.0 Module

Revision: V1.1

Customer Approval:

Company:

Title:

Signature:

Date:

BL-link Approval:

Title:

Signature:

Date:

Revision History

Revision	Summary	Release Date	Revised By
1.0	Official release (change product picture)	2020-06-24	
1.1	Update the specification version	2023-07-07	Ch

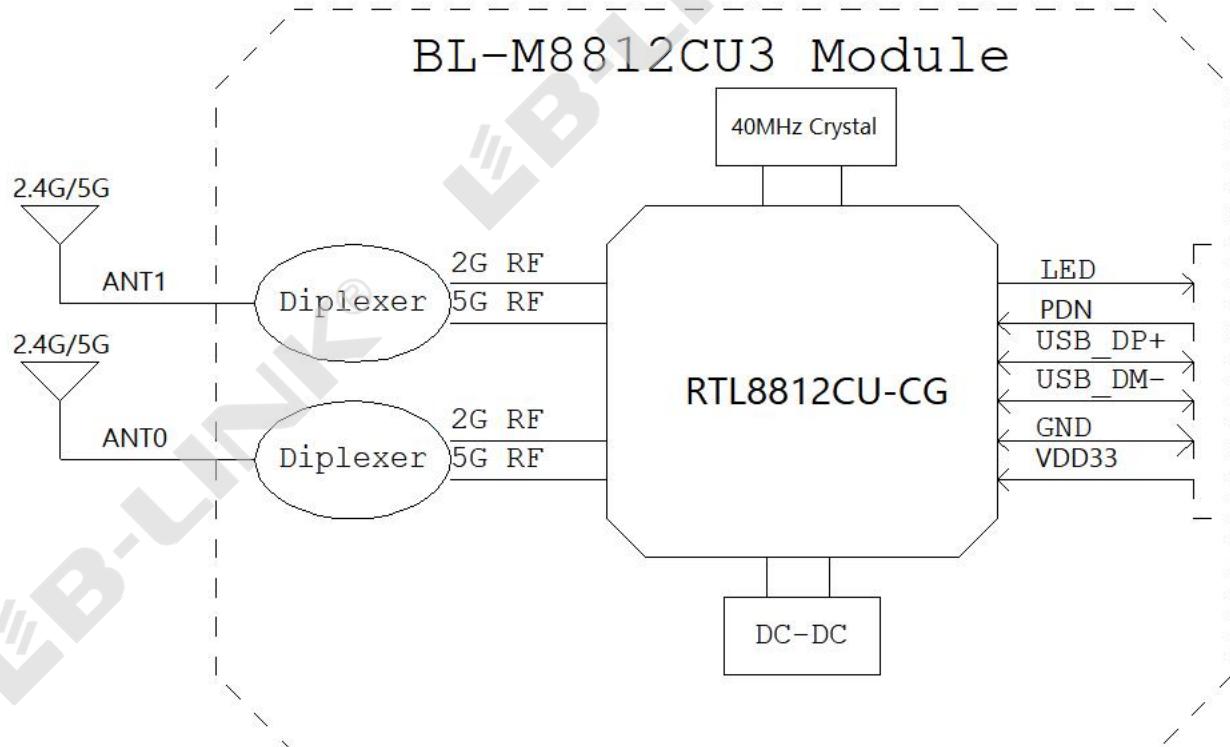
1. Introduction

BL-M8812CU3 is a highly integrated module that was built in a 2*2 dual-band wireless LAN radio. It combines a WLAN MAC, a 2T2R capable WLAN base band. It supports IEEE 802.11a/b/g/n/ac standard and provides the highest PHY rate up to 867Mbps, It can offer feature-rich wireless connectivity and reliable throughput from an extended distance.

1.1 Features

- Operating Frequencies: 2.4~2.4835GHz and 5.15~5.85GHz
- IEEE Standards: IEEE 802.11a/b/g/n/ac
- Wireless PHY rate can reach up to 867Mbps
- Connect to external antennas through IPEX connectors
- Host Interface is USB2.0
- Power Supply: DC 3.3V±0.2V main power supply

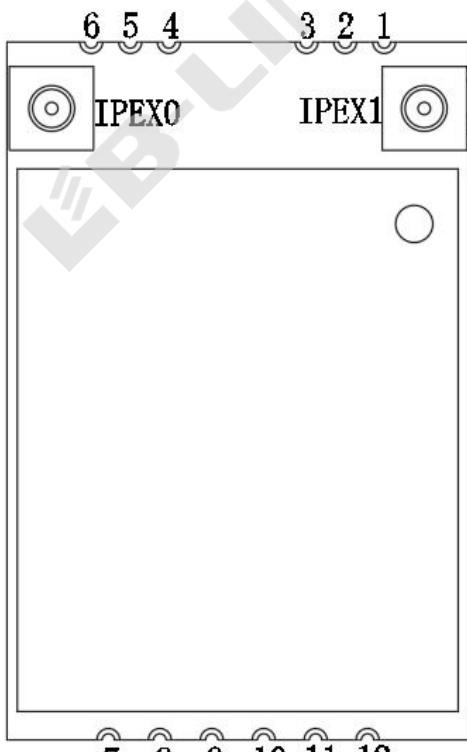
1.2 Block Diagram



1.3 General Specifications

Module Name	BL-M8812CU3
Chipset	RTL8812CU-CG
WLAN Standards	IEEE802.11a/b/g/n/ac
Host Interface	USB2.0 for WLAN
Antenna	Connect to the external antennas through IPEX connectors
Dimension	27.0*17.8*3.1mm (L*W*H)
Power Supply	DC 3.3V±0.2V @850mA (Max)
Operation Temperature	-20°C to +70°C
Operation Humidity	10% to 95% RH (Non-Condensing)

2. Pin Assignments



(Top View)

2.1 Pin Definition

No	Pin Name	Type	I/O Level	Description
1	GND	RF		RF Ground connections
2	NC	/		NC(Reserved 2.4G / 5G RF PAD for WLAN_ANT1)
3	GND	RF		RF Ground connections
4	GND	P		RF Ground connections
5	NC	/		NC(Reserved 2.4G / 5G RF PAD for WLAN_ANT0)
6	GND	RF		RF Ground connections
7	LED	O	VDD33	WLAN_LED Pin (Active Low, external current limiting resistor required); Shared with GPIO8
8	GND	P		Ground connections
9	USB_DP+	AI/O		USB Transmitter/Receiver Differential Pair
10	USB_DM-	AI/O		USB Transmitter/Receiver Differential Pair
11	VDD33	P		3.3V Main power supply
12	PDN	I	VDD33	Power Down, this Pin can externally shutdown the Module, (Active Low, internal pull high by 47K resistor)
	IPEX0	RF		2.4G/5G RF to IPEX connector for WLAN_ANT0
	IPEX1	RF		2.4G/5G RF to IPEX connector for WLAN_ANT1

P: Power or Ground; I/O: In/Output; I: Input; O :Output; AI/O: Analog In/Output; RF: Analog RF Port or RF Ground;

3. Electrical and Thermal Specifications

3.1 Recommended Operating Conditions

Parameters		Min	Typ	Max	Units
Ambient Operating Temperature		-20	25	70	°C
External Antenna Voltage Standing Wave Ratio		/	1.7	2	/
Supply Voltage	VDD33	3.1	3.3	3.5	V

3.2 Digital I/O DC Specifications

Symbol	Parameter	Min	Typ	Max	Units
VIH	Input High Voltage	2.0	3.3	3.6	V
VIL	Input Low Voltage	--	0	0.9	V
VOH	Output High Voltage	2.97	--	3.3	V
VOL	Output Low Voltage	0	--	0.33	V

3.4 Current Consumption

Conditions : VDD33=3.3V ; Ta:25°C			
Use Case	VDD33 Current (average)		
	Typ	Max	Units
WLAN Radio Off (Linux Driver)	20	50	mA
WLAN Unassociated (Linux Driver)	100	150	mA
2.4G 11b@11Mbps TX (RF-Test) 18dBm	340	380	mA
2.4G 11b@11Mbps RX (RF-Test)	200	250	mA
2.4G 11g@6Mbps TX (RF-Test) 18dBm	330	370	mA
2.4G 11g@6Mbps RX (RF-Test)	200	240	mA
2.4G 11g@54Mbps TX (RF-Test) 16dBm	240	270	mA
2.4G 11n@HT20_MCS15 TX (2RF-Test) 16dBm	270	310	mA
2.4G 11n@HT20_MCS15 RX (2RF-Test)	210	230	mA
2.4G 11n@HT40_MCS15 TX (2RF-Test) 16dBm	255	285	mA
2.4G 11n@HT40_MCS15 RX (2RF-Test)	220	260	mA
5G 6Mbps TX (RF-Test) 18dBm	390	430	mA
5G 6Mbps RX (RF-Test)	190	210	mA
5G 54Mbps TX (RF-Test) 16dBm	255	285	mA
5G 11n@HT20_MCS0 TX (RF-Test) 18dBm	290	340	mA
5G 11n@HT40_MCS15 TX (2RF-Test) 16dBm	260	290	mA
5G 11n@HT40_MCS15 RX (2RF-Test)	210	240	mA
5G 11ac@VHT80_MCS9 TX (2RF-Test) 14dBm	250	290	mA
5G 11ac@VHT80_MCS9 RX (2RF-Test)	210	230	mA

4. WLAN RF Specifications

4.1 2.4G WLAN RF Specification

Conditions : VDD33 = 3.3V ; Ta:25 °C			
Features	Description		
WLAN Standard	IEEE 802.11b/g/n		
Frequency Range	2.4~2.4835GHz(2.4GHz ISM Band)		
Channels	Ch1~Ch13 (For 20MHz Channels)		
Modulation	802.11b (DSSS): DBPSK, DQPSK, CCK; 802.11g (OFDM): BPSK, QPSK, 16QAM, 64QAM; 802.11n (OFDM): BPSK, QPSK, 16QAM, 64QAM;		
Data Rate	802.11b: 1, 2, 5.5, 11Mbps; 802.11g: 6, 9, 12, 18, 24, 36, 48, 54Mbps; 802.11n (HT20): MCS0~MCS7(1T1R_SISO) 6.5~72.2Mbps; 802.11n (HT20): MCS8~MCS15(2T2R_MIMO) 13~144.4Mbps; 802.11n (HT40): MCS0~MCS7(1T1R_SISO) 13.5~150Mbps; 802.11n (HT40): MCS8~MCS15(2T2R_MIMO) 27~300Mbps;		
Frequency Tolerance	≤±20ppm		
2.4G Transmitter Specifications (WLAN_ANT0 & WLAN_ANT1. TX power of some rates is calibrated, customers can define the target TX power of other rates by modifying configuration file of the driver software. Customers must define the TX power same or lower than recommended Target TX Power as below)			
TX Rate	TX Power (dBm)	TX Power Tolerance (dBm)	EVM (dB)
802.11b@1Mbps	Recommended Target TX Power : 18	±1.5	≤ -10
802.11b@11Mbps	Calibrated TX Power : 18	±1.5	≤ -10
802.11g@6Mbps	Recommended Target TX Power : 18	±1.5	≤ -10
802.11g@54Mbps	Calibrated TX Power : 16	±1.5	≤ -25
802.11n@HT20_MCS0	Recommended Target TX Power : 18	±1.5	≤ -10
802.11n@HT20_MCS7	Calibrated TX Power : 16	±1.5	≤ -28
802.11n@HT40_MCS0	Recommended Target TX Power : 18	±1.5	≤ -10
802.11n@HT40_MCS7	Calibrated TX Power : 16	±1.5	≤ -28
2.4G Receiver Specifications (WLAN_ANT0 & WLAN_ANT1)			

RX Rate	Min Input Level(Typ.dBm)	Max Input Level (Typ.dBm)	PER
802.11b@1Mbps	-93	-10	< 8%
802.11b@11Mbps	-87	-10	< 8%
802.11g@6Mbps	-91	-10	< 10%
802.11g@54Mbps	-73	-10	< 10%
802.11n@HT20_MCS0	-90	-10	< 10%
802.11n@HT20_MCS7	-71	-10	< 10%
802.11n@HT40_MCS0	-86	-10	< 10%
802.11n@HT40_MCS7	-68	-10	< 10%

4.2 5G WLAN RF Specification

Conditions: VDD33=3.3V; Ta:25°C	
Features	Description
WLAN Standard	IEEE 802.11a/n/ac
Frequency Range	5.15~5.25GHz; 5.25~5.35GHz; 5.47~5.73GHz; 5.735~5.835GHz (5GHz ISM Band)
Channels	Ch36, Ch40, Ch44, Ch48; Ch52~Ch64; Ch100~Ch140; Ch149~Ch165 (For 20MHz Channels)
Modulation	802.11a (OFDM): BPSK, QPSK, 16QAM, 64QAM; 802.11n (OFDM): BPSK, QPSK, 16QAM, 64QAM; 802.11ac (OFDM): BPSK, QPSK, 16QAM, 64QAM, 256QAM;
Data Rate	802.11a: 6, 9, 12, 18, 24, 36, 48, 54Mbps; 802.11n (HT20): MCS0~MCS7(1T1R_SISO) 6.5~72.2Mbps; 802.11n (HT20): MCS8~MCS15(2T2R_MIMO) 13~144.4Mbps; 802.11n (HT40): MCS0~MCS7(1T1R_SISO) 13.5~150Mbps; 802.11n (HT40): MCS8~MCS15(2T2R_MIMO) 27~300Mbps; 802.11ac (VHT20): MCS0~MCS8(1T1R_SISO) 6.5~86.7Mbps; 802.11ac (VHT20): MCS0~MCS8(2T2R_MIMO) 13~173.3Mbps; 802.11ac (VHT40): MCS0~MCS9(1T1R_SISO) 13.5~200Mbps; 802.11ac (VHT40): MCS0~MCS9(2T2R_MIMO) 27~400Mbps; 802.11ac (VHT80): MCS0~MCS9(1T1R_SISO) 29.3~433.3Mbps; 802.11ac (VHT80): MCS0~MCS9(2T2R_MIMO) 58.5~866.7Mbps;

Frequency Tolerance	$\leq \pm 20\text{ppm}$
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5G Transmitter Specifications (WLAN_ANT0 & WLAN_ANT1. TX power of some rates is calibrated, customers can define the target TX power of other rates by modifying configuration file of the driver software.

Customers must define the TX power same or lower than recommended Target TX Power as below)

TX Rate	TX Power (dBm)	TX Power Tolerance (dBm)	EVM (dB)
802.11a@6Mbps	Recommended Target TX Power : 18	± 1.5	≤ -10
802.11a@54Mbps	Calibrated TX Power : 16	± 1.5	≤ -25
802.11n@HT20_MCS0	Recommended Target TX Power : 18	± 1.5	≤ -10
802.11n@HT20_MCS7	Calibrated TX Power : 16	± 1.5	≤ -28
802.11n@HT40_MCS0	Recommended Target TX Power : 18	± 1.5	≤ -10
802.11n@HT40_MCS7	Calibrated TX Power : 16	± 1.5	≤ -28
802.11ac@VHT20_MCS0	Recommended Target TX Power : 18	± 1.5	≤ -10
802.11ac@VHT20_MCS8	Calibrated TX Power : 16	± 1.5	≤ -30
802.11ac@VHT40_MCS0	Recommended Target TX Power : 18	± 1.5	≤ -10
802.11ac@VHT40_MCS9	Calibrated TX Power : 16	± 1.5	≤ -32
802.11ac@VHT80_MCS0	Recommended Target TX Power : 16	± 1.5	≤ -10
802.11ac@VHT80_MCS9	Calibrated TX Power : 14	± 1.5	≤ -32

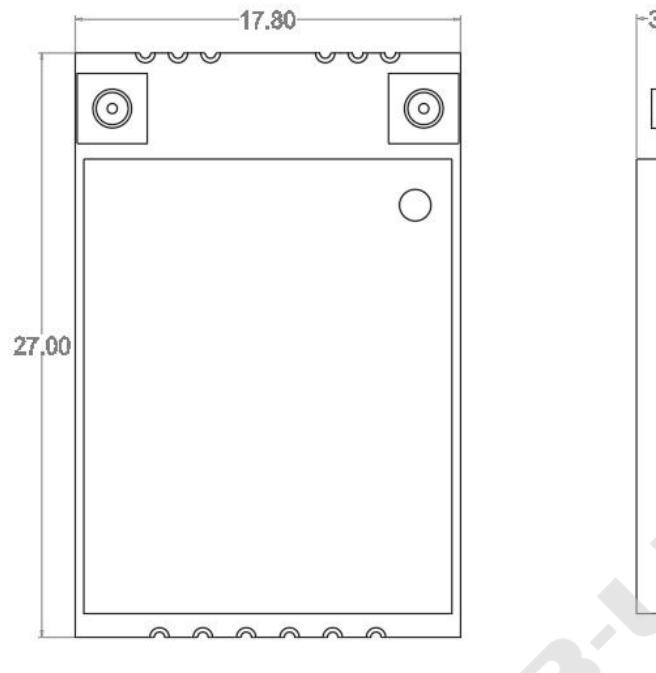
5G Receiver Specifications (WLAN_ANT0 & WLAN_ANT1)

RX Rate	Min Input Level(Typ.dBm)	Max Input Level (Typ.dBm)	PER
802.11a@6Mbps	-90	-10	< 10%
802.11a@54Mbps	-72	-10	< 10%
802.11n@HT20_MCS0	-89	-10	< 10%
802.11n@HT20_MCS7	-70	-10	< 10%
802.11n@HT40_MCS0	-86	-10	< 10%
802.11n@HT40_MCS7	-68	-10	< 10%

802.11ac@VHT80_MCS0	-84	-10	< 10%
802.11ac@VHT80_MCS9	-58	-10	< 10%

5. Mechanical Specifications

5.1 Module Outline Drawing



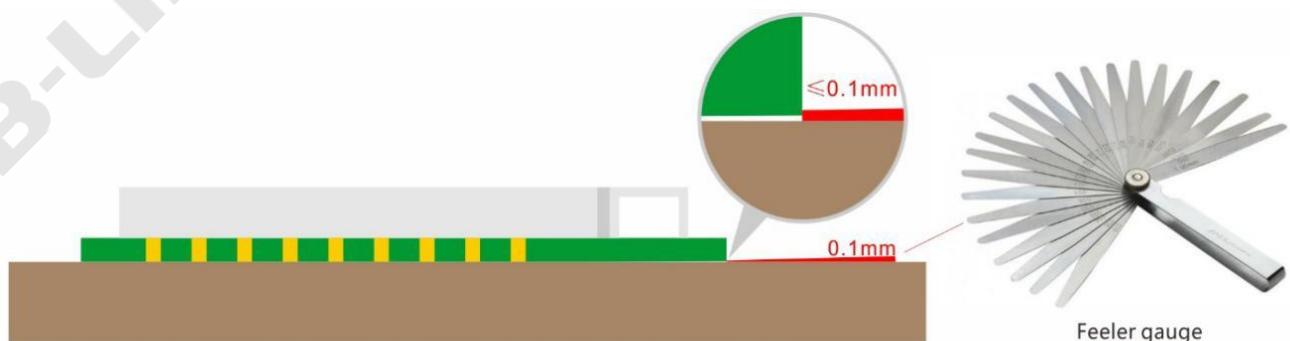
(Top View)

(Side View)

(Bottom View)

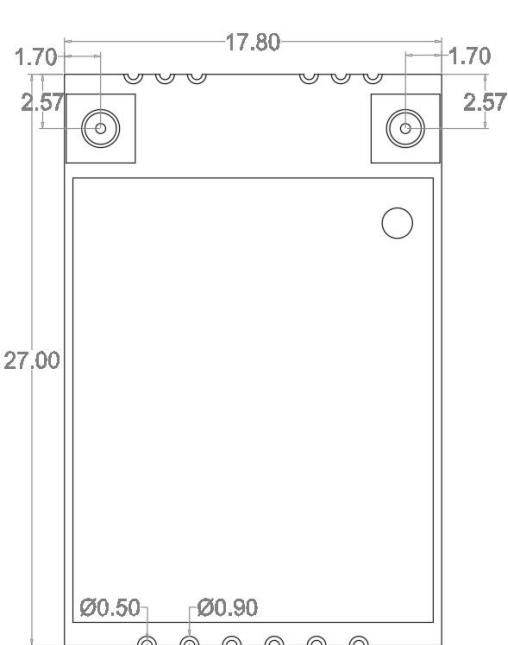
Module dimension: 27.0mm*17.8mm*3.1mm (L*W*H ; Tolerance: $\pm 0.15\text{mm}$)

IPEX / MHF-1 connector dimension: 3.0*2.6*1.2mm (L*W*H, Ø2.0mm)



Module Bow and Twist: $\leq 0.1\text{mm}$

5.2 Mechanical Dimensions



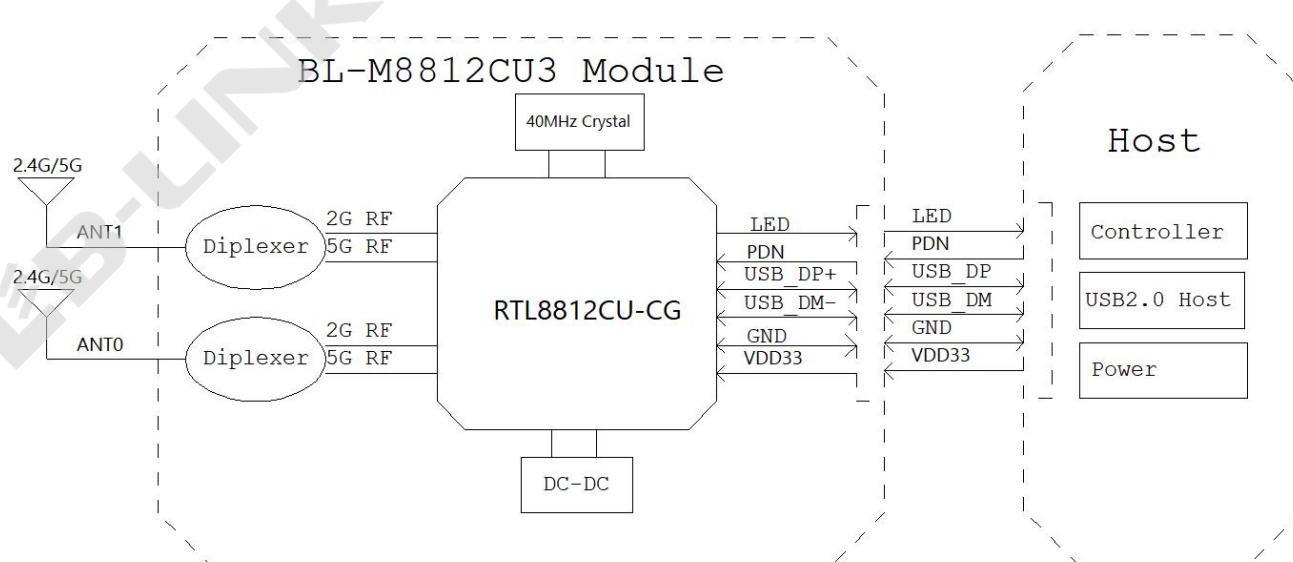
(Top View)



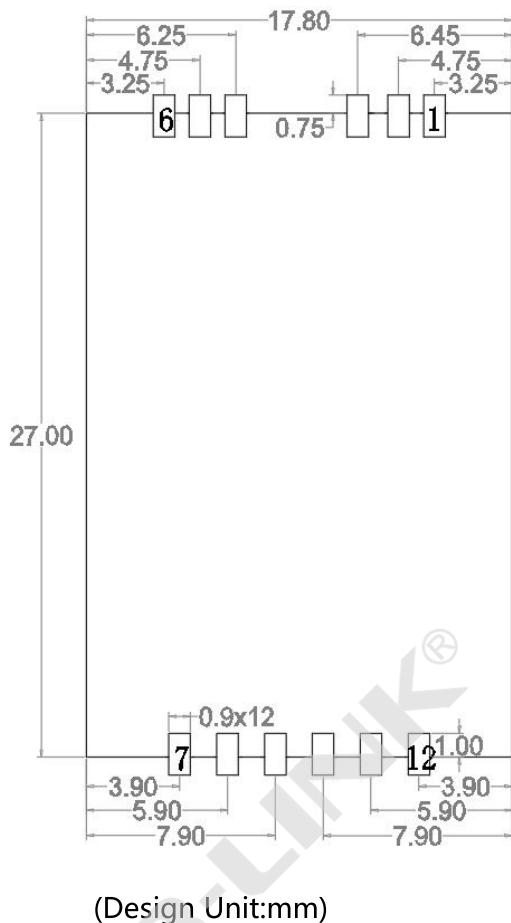
(Bottom View)

6. Application Information

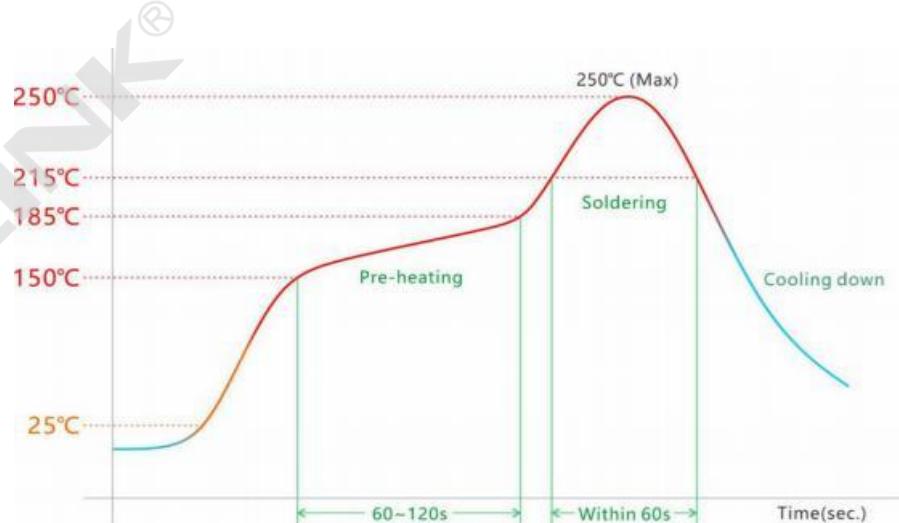
6.1 Typical Application Circuit



6.2 Recommend PCB Layout Footprint



6.3 Reflow Soldering Standard Conditions



Please use the reflow within 2 times.

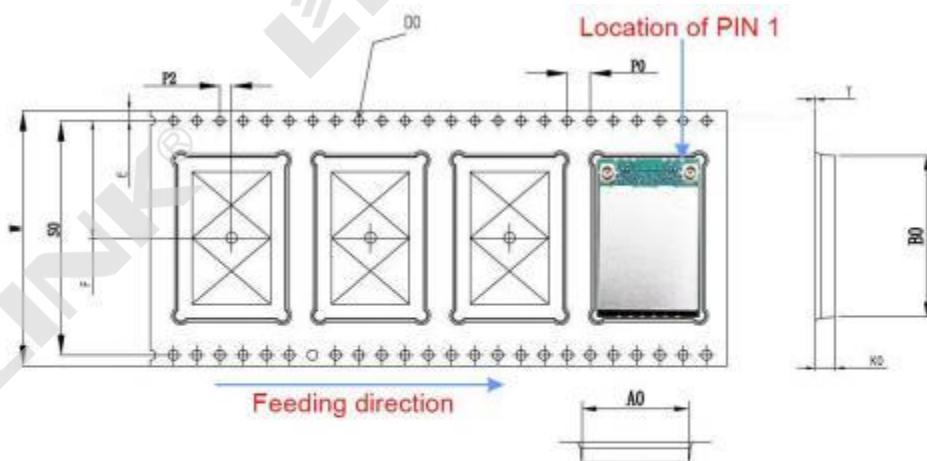
Set up the highest temperature within 250°C .

7. Key Components Of Module

No.	Parts	Specification	Manufacturer	Note
1	Chipset	RTL8812CU-CG	Realtek Semiconductor Corp. ShenZhen Tie Fa Technology Limited	
2	PCB	BL-M8812CU3	Huizhou Dayawan Kexiang Technology Circuit Board Co., Ltd SHEN ZHEN QILI ELECTRON CO.,LTD HUBEI TKD CRYSTAL ELECTRONIC SCIENCE AND TECHNOLOGY CO.,LTD	
3	Crystal	40MHz-3225	LUCKI CM ELECTRONICS CO.,LTD Chengde oscillator Electronic Technology CO.,LTD	
4	Diplexer	DIP1608	Dongguan Hekang Electronics Co.,LTD Advanced Ceramic X Corp.	

8. Package and Storage Information

8.1 Package Dimensions



ITEM	W	A0	B0	K0	E	F	P	P0	P2	D0	T
DIM	44.00±0.3	18.10±0.1	27.40±0.1	3.50±0.1	1.75±0.1	20.2±0.1	24.00±0.1	4.00±0.1	2.00±0.1	01.5±0.1	0.30±0.05

**Package specification:**

1. 700 modules per roll and 2,800 modules per box.
2. Outer box size: 37.5*36*29cm.
3. The diameter of the blue environment-friendly rubber plate is 13 inches, with a total thickness of 48mm (with a width of 44mm carrying belt).
4. Put 1 package of dry agent (20g) and humidity card in each anti-static vacuum bag.
5. Each carton is packed with 4 boxes.

8.2 Storage Conditions

Absolute Maximum Ratings:

Storage temperature: -40°C to +85°C

Storage humidity: 10% to 95% RH (Non-Condensing)

Recommended Storage Conditions:

Storage temperature: 5°C to +40°C

Storage humidity: 20% to 90% RH

Please use this Module within 12month after vacuum-packaged.

The Module shall be stored without opening the packing.

After the packing opened, the Module shall be used within 72hours.

When the color of the humidity indicator in the packing changed,
the Module shall be baked before soldering.

Baking condition : 60°C, 24hours, 1time.

ESD Sensitivity:

ESD Protection: 2KV(HBM, Maximum rating)

The Module is a static-sensitive electronic device.

Do not operate or store near strong electrostatic fields.

Take proper ESD precautions!



ESD CAUTION

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